EFFECTIVENESS OF MISSOURI MATHEMATICS PROJECT (MMP) LEARNING MODEL AND COOPERATIVE LEARNING MODEL OF NUMBERED HEADS TOGETHER (NHT) LEARNING ON THE MATHEMATICS LEARNING OUTCOME

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ABSTRACT

Mathematics learning at SMP Negeri 15 Yogyakarta used speech method and given questions that impact making students bored when mathematics learning. Used the wrong model to make students are challenging to develop and also to the learning outcome. So, we need the right model. The model is an MMP and cooperative learning type NHT. This research aims to find a significant difference between the use of MMP learning with the use of cooperative learning type NHT, which is better MMP learning than NHT cooperative learning to the student's mathematics learning outcome. This research population was the seventh degree of SMP Negeri 15 Yogyakarta consisting of ten classes and two classes as the sample with random sampling. The sample is VII B as the experiments A with MMP learning and VII D as the experiment B with cooperative learning type NHT. The research instrument used was a mathematics learning outcome, and analysis used validity, distinguishing capacity, and reliability. The data analysis used was the t-test two parties and one party. Based on the analysis of the first hypothesis test on mathematics learning outcome with a significance level of 5% and 65 degrees of freedom is obtained $t_{count} = 2{,}9218, t_{table} = 1{,}9986$ so $t_{count} > t_{table}$ then there is a significant difference between the use MMP learning with the use cooperative learning type NHT. The second test with a significance level of 5% and 65 degrees of freedom is obtained $t_{count} = 2{,}9218, t_{table} = 1{,}6695$, so $t_{count} > t_{table}$ then MMP learning better than NHT cooperative learning to the student's mathematics learning outcome.

Keywords: effectiveness, MMP learning model, cooperative learning type NHT, student mathematics learning outcome.

INTRODUCTION

Education is an essential factor in life. In-Law Number 20 the Year 2013 concerning the National Education System, it is stated that Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have moral, spiritual strength, self-control, personality, intelligence, noble morality, and the skills needed by himself, the people, the nation and the country. Mathematics is one of the subjects that can develop one's potential, skills, and intelligence. This can be seen from the goals of mathematics learning so that students learn to digest new ideas, be able to adapt to changes, be able to deal with uncertainties, be able to find regularities, and be able to solve unusual problems (Sadiq, Fadjar:2014). The teacher has a vital role in realizing the goals of mathematics learning. The teacher must create a learning process that facilitates students to be active and develop their skills in the classroom. One of them is by paying attention to the learning methods or models used in the learning process.

Based on the results of an interview with one of the seventh-grade mathematics teachers at SMP Negeri 15 Yogyakarta on Thursday, October 13, 2016, Mr. Sukrisno, the fact is that the mathematics learning process still uses the lecture method, and questions and answers. Students' condition during the learning process is challenging to develop and difficult to be orderly when given an assignment. According to several VII grade students in Yogyakarta 15 Middle School, they felt difficulties in mathematics and felt less enthusiastic about the learning model used.

Based on the Midterm Odd Test results for the 2016/2017 school year in mathematics, the average grade of VII grade students of SMP Negeri 15 Yogyakarta is still below the minimum expected completeness criteria, which is 75.00. This shows that student mathematics learning outcomes are still low. The low student achievement in mathematics is evidence that mathematics is still considered difficult. One of the teacher's efforts related to mathematics learning outcomes is selecting learning models that are considered appropriate to be applied to students. After the teacher chooses and determines the learning model that will be used, the teacher will act according to the model.

The learning model chosen by the teacher should be a learning model that can improve students' skills and intelligence so that their thinking ability will develop. Learning models that can develop students' thinking skills are project-based (Ratumanan, 2015: 267). One of the project-based learning models in mathematics learning is the Missouri mathematics project (MMP), learning model. According to Good L, Thomas, and Douglas A Grouw (1979: 357) and Sadiq, Fadjar (2009: 21), the steps in the MMP learning model are daily review, development, and training teacher guidance, seatwork, and closing. A study comparing the use of MMP learning with expository learning shows that MMP learning is more effective than expository learning on mathematics learning outcomes. This is indicated by the average gain in student learning outcomes using the MMP learning model better than the average gain in student learning outcomes using expository learning (Alifa Nurhayati, 2011).

Besides, the learning model that can be chosen by the teacher is also a learning model that can attract the attention of students to be more active in the learning process, especially mathematics, and can establish interactions between students and teachers and between students and students. Among them is the cooperative learning model. Hamzah, Ali, and Muhlisrarini (2014: 163-171) mentioned several types of cooperative learning models, including Jigsaw, Numbered Heads Together (NHT), Students Teams Achievement Division (STAD), Think Pair and Share (TPS), Investigation Group. While Trianto (2009: 82) argues, NHT is a type of cooperative learning that is designed to influence student interaction patterns and as an alternative to traditional classroom structures. A study comparing the use of MMP learning models with NHT learning models shows that MMP learning models are more effective than NHT learning models on mathematics learning outcomes. This is indicated by hypothesis testing using Mann-Whitney non-parametric test with a real level $\alpha = 0.05$, obtained Exact sig 1-tailed value <that is 0.004 <0.05, so H0 is rejected and Ha is accepted which means student learning outcomes with the model MMP is higher than student learning outcomes with the NHT model (Nonce Situmorang, 2015).

The purpose of this study is 1) For the presence or absence of significant differences between mathematics learning outcomes in students taught using the Missouri mathematics project learning model and students taught using the numbered heads together type of cooperative learning model in class VII students of SMP Negeri 15 Yogyakarta. And 2) To find out a better learning model between the Missouri mathematics project learning model and the numbered heads together type of cooperative learning model towards mathematics learning outcomes in grade VII students of SMP Negeri 15 Yogyakarta.

RESEARCH METHOD

This research was conducted in Yogyakarta 15 Public Middle School in the even semester of the 2016/2017 school year. The type of this research is True Experimental Design with a pretest-posttest only control design (Sugiyono:2014). The population in this study was seventh-grade students of the even semester of SMP Negeri 15 Yogyakarta in the 2016/2017 school year consisting of 10 classes. Sampling in this study was carried out using random sampling techniques for population classes because the ten classes' capabilities were relatively similar from the sampling obtained class VII B as experimental class A and class VII B as experimental class B. The experimental class A was given a pretest and then treated with the MMP learning model. At the saSimultaneouslyerimental class, B was given a pretest and then treated with the NHT type cooperative learning model. Before giving a posttest to students in experiment-restless A and experimental class B students, a mathematics learning outcomes test was conducted in the experimental class to determine the validity and distinguishing features of the test items and the reliability of the test instruvalid instruments' reliability used product-moment correlation formula (Arikunto,

Suharsimi, 2009: 72) and to test the differentiation of items used the discrimination index formula (Arikunto, Suharsimi, 2009: 211-214). Whereas to test the reliability of the test instruments used the Richardson Cadre formula (KR-20) (Riduwan:2011). The technical analysis of the data in this study used a two-party and one-party t-test. However, before the analysis test was cared for, however, out, the analysis prerequisite test was carried out, namely the two-party t-test, normality test, and homogeneity test on the data of students' initial ability grades VII B and VII D taken from the pretest scores. In this study, the normality test method used is the Chi-Square method (Sugiyono;2007). Simultaneously, the method used for the homogeneity test is the Bartlett test (Riduwan:2011).

RESULTS AND DISCUSSION

Based on the calculation results for the normality test on the initial ability value of experimental class A obtained $\chi^2_{count} = 11{,}05696$ and in experimental class B obtained χ^2_{count} = 10.51008. With a significance level of 0.05 and degrees of freedom = 5 both in experimental class A and experimental class B, and χ^2_{table} = 11.0705 shows that $\chi^2_{count} \leq \chi^2_{table}$ then the value data initial ability both experimental class A and experimental class B are normally distributed. While the calculation results for the homogeneity test obtained χ^2_{count} = 0.015909 and χ^2_{table} = 3.8415. Because $\chi^2_{count} < \chi^2_{table}$, the variance of student's initial ability values used as research samples is homogeneous. The results of calculations for the two-party t-test data of students' initial ability values obtained t_{count}= 0.6139 and with a significance level of 0.05 and a degree of freedom 65 obtained t_{table}= 1.9986. H1 is accepted if $t_{count} > t_{table}$. Because the value of $t_{count} < t_{table}$, H0 is accepted. So it can be concluded that there is no significant difference between students' initial mathematical abilities in experimental class A and experimental class B.

The instrument used in this study was a mathematics learning achievement test in the form of multiple-choice questions. Based on the results of the validity test, 18 items were declared valid with minimum criteria is enough. Valid test questions are then tested for distinguishing results with the classification results of 3 items perfect, 14 items good, and two items enough. Besides, the instrument was also tested for reliability. The reliability test results obtained r_{count} = 0.839 and r_{count}= 0.349. Because $r_{count} > r_{count}$, the test instrument is declared reliable.

The next step is to provide learning treatment in both classes. Posttest was given to students of experimental class A and experimental class B after both received treatment. Before the hypothesis test is carried out, the two-party t-test and the one-party test of the results of the mathematics learning outcomes posttest, normality test, and homogeneity test of the posttest results are first performed.

Based on the calculation results for the normality test on the data value of mathematics learning outcomes in students in experimental class A obtained χ^2_{count} = 7.884568 and in experimental class B students obtained χ^2_{count} = 9.068089. With a significance level of 0.05 and degrees of freedom = 5 both in experimental class A and experimental class B, and χ^2_{table} = 11.0705 shows that $\chi^2_{count} \leq \chi^2_{table}$ then the value data Mathematics learning achievement test results in both experimental class A and experimental class B students are normally distributed. While the calculation results for the homogeneity test obtained χ^2_{count} = 3.365666 and χ^2_{table} = 3.8415. Because $\chi^2_{count} < \chi^2_{table}$then the data variance in the value of mathematics learning achievement tests for students used as research samples is homogeneous.

The calculation results for the two-party t-test data on the value of mathematics learning outcomes for students with a significance level of 0.05 and a degree of freedom 65 obtained t_{count} = 2.9218 and t_{table} 1.9986. H1 is accepted if $t_{count} > t_{table}$. Because the value of $t_{count} > t_{table}$, then H1 is accepted. So it can be concluded that there is a significant difference between mathematics learning outcomes in students taught using the MMP learning model and those using NHT type cooperative learning models in class VII students of SMP Negeri 15 Yogyakarta in the 2016/2017 school year.

The results of calculations for the t-test - one party data value of mathematics learning outcomes in students with a significance level of 0.05 and degrees of freedom 65 obtained t_{count} = 2.9218 and t_{table} = 1.6695. H1 is accepted if $t_{count} > t_{table}$. Because the value of $t_{count} > t_{table}$, then H1 is accepted.

So it can be concluded that the MMP learning model is better than the NHT type of cooperative learning model towards mathematics learning outcomes in grade VII students of SMP Negeri 15 Yogyakarta in the 2016/2017 school year.

This is consistent with the opinion of Good L, Thomas, and Grouws, A Douglas (1979: 361), which states that an increase in achievement in schools occurs shown by this MMP. Besides, the results of this study are also by research conducted by Situmorang, Nonce (2014), namely student learning outcomes with the MMP model are higher than student learning outcomes with the NHT model.

The MMP learning model emphasizes the use of exercises in the learning process. Cooperative learning at the training stage with the teacher's guidance can also motivate them to increase their understanding of the group through the exercises provided. In this cooperative study, students can interact with the group members and participate in working out the exercises provided. Besides, students become more skilled in various problems because of the seatwork and cover (by giving PR), students are given various questions done independently. This can strengthen the understanding of concepts and materials in students who can make their learning outcomes. Julaiha, Ella (2016:193) mentioned that in MMP learning, there is a review stage as a material review process, then there is homework assignment as a feedback stage for students ' understanding. If the review level can be received by the students well, students can associate the concept of mathematics and homework assignments performed by students; students will be able to formulate mathematical problems that have been learned.

Unlike the classes that use the NHT type Cooperative learning model. In this learning model, students try to understand the task given by group teachers and the students who are appointed according to the number mentioned presenting the results in front of their friends. In this class, the discussion process is less well-established and less conducive. This happens because only a few students in one group are trying to complete the assignment given by the teacher, and some other students rely solely on the members of the group. Thus, this condition leads to still existing students who have not been able to understand thoroughly the task given by the teacher. In fact, in this group discussion should each group ensure that each member can understand and work on the task given by the teacher. As a result, not all students in the classroom understand the teacher's teaching and learning materials and have an impact on understanding the concept of less powerful students and the results of the study. It is by the opinion of Hamdayana, Jumanta (2014:177-178) that "students who are familiar with the conventional way will be slightly overwhelmed and not all have a turn.

These differences lead to differences in mathematical learning outcomes among students between classes using MMP learning models and classes using NHT-type cooperative learning models and MMP learning models better Model of NHT-type cooperative learning towards mathematical learning outcomes.

CONCLUSION

Based on the results of the data analysis and the discussion that has been outlined in front, the researcher can conclude as follows:

1. Based on hypotheses/test-t test result of two parties with the level of significance 5% and degree of Freedom 65, obtained value t_{count} = 2,9218, t_{table} = 1,9986 then $t_{count} > t_{table}$. So H_0 rejected, and H_1 received. There is a significant difference between the results of mathematics learning in students who are taught using the MMP learning model by using a cooperative learning model of NHT type in class VII in the even semester of SMP Negeri 15 Yogyakarta Year Doctrine of 2016/2017.
2. Based on the results of hypotheses/test-t test with the level of significance 5% and degree of Freedom 65, obtained value t_{count} = 2,9218, t_{table} = 1,6695 then $t_{count} > t_{table}$. So H_0 rejected, and H_1 received. This means that the MMP learning model is better than the NHT cooperative learning model of mathematical learning outcomes in grade VII students in the middle of SMP Negeri 15 Yogyakarta school year 2016/2017.

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